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PATENT ABSTRACTS OF JAPAN

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(54) SINGLE ELECTRONIC ELEMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To enclose carriers in quantum dots even at a high temperature by forming tunnel barriers having narrow widths and large energy barriers in the top cover of a V-groove.

SOLUTION: A source 106 and a drain 107 exist at the end section of a thin silicon wire 100 and a gate 108 exists on the silicon wire 100 with an insulating film 104 in between. Two V-grooves 105 are formed at the central part of the top cover of the silicon wire 100 so that the wire 100 cannot be cut by the grooves 105. An inverted layer in the small area between the grooves 105 becomes a quantum dot structure between potential barriers. The grooves 105 have sharp shapes at their bottom sections and, since the potential barriers formed in the bottom sections have small widths, electrons supplied from the source 106 can tunnel to the quantum dot structure. In addition, the electrons injected into quantum dots can tunnel to the drain 107 side.